

HRS DOCUMENTATION RECORD COVER SHEET

Name of Site: Jacobsville Neighborhood Soil Contamination

EPA ID No. INN000508142

EPA Site/Spill ID- B51Z

Contact Persons

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Pathways, Components, or Threats Not Scored

The Ground Water, Surface Water, and Air Pathways were not evaluated at this time due to a lack of sufficient documentation to support a scoring analysis.

HRS DOCUMENTATION RECORD

Name of Site: Jacobsville Neighborhood Soil Contamination

EPA Region: V

Date Prepared: 2/19/2002

Street Address of Site: Area between Division Street and Iowa Street and between Governor Street and Mary Street

City, County, State: Evansville, Vanderburgh County, Indiana , 47710

General Location in the State: southwest corner of the State

Topographic Map: Evansville South, Indiana-Kentucky Quadrangle, 7.5 minute series

Latitude: 37° 58' 45.47" North Longitude: 87° 33' 50.36" West

Site Reference Point: Intersection of North Main Street and Illinois Street.

Ref: 3, 4, 5

Scores

Air Pathway

Ground Water Pathway

Soil Exposure Pathway 71.04

Surface Water Pathway

HRS SITE SCORE 35.52

WORKSHEET FOR COMPUTING HRS SITE SCORE

	<u>S</u>	<u>S²</u>
1. Ground Water Migration Pathway Score (S _{gw}) (from Table 3-1, line 13)	—	—
2a. Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	—	
2b. Ground Water to Surface Water Migration Component (from Table 4-25, line 28)	—	
2c. Surface Water Migration Pathway Score (S _{sw}) Enter the larger of lines 2a and 2b as the pathway score.	—	—
3. Soil Exposure Pathway Score (S _s) (from Table 5-1, line 22)	<u>71.04</u>	<u>5,046.68</u>
4. Air Migration Pathway Score (S _a) (from Table 6-1, line 12)	—	—
5. Total of S _{gw} ² + S _{sw} ² + S _s ² + S _a ²		<u>5,046.68</u>
6. HRS Site Score Divide the value on line 5 by 4 and take the square root		<u>35.52</u>

TABLE 5-1
SOIL EXPOSURE PATHWAY SCORESHEET

Factor Categories and Factors	Maximum Value	Value Assigned
RESIDENT POPULATION THREAT		
<u>Likelihood of Exposure</u>		
1. Likelihood of Exposure	550	<u>550</u>
<u>Waste Characteristics</u>		
2. Toxicity	a	<u>10,000</u>
3. Hazardous Waste Quantity	a	<u>10</u>
4. Waste Characteristics	100	<u>18</u>
<u>Targets</u>		
5. Resident Individual	50	<u>45</u>
6. Resident Population		
6a. Level I Concentrations	b	<u>0</u>
6b. Level II Concentrations	b	<u>542</u>
6c. Resident Population (lines 6a + 6b)	b	<u>542</u>
7. Workers	15	<u>5</u>
8. Resources	5	<u>0</u>
9. Terrestrial Sensitive Environments	c	<u>0</u>
10. Targets (lines 5 + 6c + 7 + 8 + 9)	b	<u>592</u>
<u>Resident Population Threat Score</u>		
11. Resident Population Threat (lines 1 x 4 x 10)	b	<u>5,860,800</u>
NEARBY POPULATION THREAT		
<u>Likelihood of Exposure</u>		
12. Attractiveness/Accessibility	100	<u>NS</u>
13. Area of Contamination	100	<u>NS</u>
14. Likelihood of Exposure	500	<u>NS</u>
<u>Waste Characteristics</u>		
15. Toxicity	a	<u>10,000</u>
16. Hazardous Waste Quantity	a	<u>10</u>
17. Waste Characteristics	100	<u>18</u>

<u>Factor Categories and Factors</u>	<u>Maximum Value</u>	<u>Value Assigned</u>
NEARBY POPULATION THREAT (Concluded)		
<u>Targets</u>		
18. Nearby Individual	1	<u>NS</u>
19. Population Within 1 Mile	b	<u>NS</u>
20. Targets (lines 18 + 19)	b	<u>NS</u>
<u>Nearby Population Threat Score</u>		
21. Nearby Population Threat (lines 14 x 17 x 20)	b	<u>NS</u>
SOIL EXPOSURE PATHWAY SCORE		
22. Soil Exposure Pathway Score ^d (S _s), (lines [11 + 21]/82,500, subject to a maximum of 100)	100	<u>71.04</u>

^aMaximum value applies to waste characteristics category.

^bMaximum value not applicable.

^cNo specific maximum value applies to factor. However, pathway score based solely on terrestrial sensitive environments is limited to maximum of 60.

^dDo not round to nearest integer.

REFERENCES

- | Ref.
No. | Description of the Reference |
|-------------|--|
| 1. | U.S. Environmental Protection Agency (EPA). Hazard Ranking System, 40 CFR Part 300, Appendix A, 55 FR 51533. December 14, 1990. 136 pages. |
| 2. | EPA. Superfund Chemical Data Matrix. January 2004. Page BI-8. |
| 3. | U.S. Geological Survey (USGS), 7.5-minute series Topographic Quadrangle Map of Evansville South, Indiana-Kentucky 1973, Photorevised 1999, Scale 1:24,000. |
| 4. | Sure Maps Raster, Version 2.03, 1997, Horizon Technology. |
| 5. | IDEM, Map of Jacobsville Neighborhood Contaminated Soil Site Evansville IN: Area A & B; Soil Sample Locations with CLP Concentrations Greater than 400 ppm Lead. |
| 6. | Indiana Department of Environmental Management Site Inspection (Combined PA/SI) for Jacobsville Neighborhood Soil Contamination Site Evansville, Indiana Vanderburgh County U.S. EPA ID: IND000508142, July 12, 2002. 387 pages. |
| 7. | Telephone conversation between Leah Brown (employee of Buehler's Buy-Lo) and Mark Jaworski (IDEM staff), August 22, 2002. |
| 8. | Wright, Lorraine, Source Area and Population Calculations for the Jacobsville Neighborhood Site, Evansville, IN. September 9, 2002. 2 pages. |
| 9. | IDEM, Map of Jacobsville Neighborhood Soil Contamination Site, Evansville, IN: Area A, Area B, and 2000 Census Block Group Population Numbers. September 12, 2002. |
| 10. | IDEM, Map of Jacobsville Neighborhood Soil Contamination Site, Evansville, IN: 2000 Census Population and One, Half and Quarter Mile Buffers from Area A & B (lead contamination areas). September 12, 2002. |
| 11. | IDEM, Jacobsville Neighborhood Soil Contaminated Site, Evansville IN: Population Within One, Half, and Quarter Mile Buffer Zones from Area A & B (lead contamination areas). September 12, 2002. |
| 12. | IDEM, Relationship between X-Ray Fluorescence Lead Analysis and Contract Laboratory Lead Analysis |
| 13. | Email correspondence between Lorraine Wright (IDEM) and Jan Pels (EPA) regarding the algorithm used for the area calculation. December 22, 2003. 2 pages. |
| 14. | Telephone conversation with Cathie White (property owner) and Mark Jaworski (IDEM staff) on September 26, 2003 regarding lead base paint at 619 SE Second Street. |
| 15. | Sedlacek, Thomas, Data Narrative for the field XRF data. December 12, 2003. 15 pages. |
| 16. | EPA, Using Qualified Data to Document an Observed Release and Observed Contamination, November 1996. 18 pages. |
| 17. | Kelly, Leo A., 1976, Soil Survey of Vanderburgh County, Indiana. 93 pages. |
| 18. | Telephone conversation between Deborah McKnight (homeowner) and Mark Jaworski (IDEM staff) on February 4, 2004 regarding nearest resident individual at 403 Read Street. |

Site Summary

The Jacobsville Neighborhood Soil Contamination (JNSC) site is located in Evansville, Indiana in a predominantly residential area including a hospital, a school, and several small businesses. The contamination was discovered during an analysis of residential soils collected as part of a reassessment for the Evansville Plating Works (EPW), U.S. EPA ID: IND006383145, which revealed elevated levels of lead. The EPW site is an abandoned electroplating and metal refinishing facility. In 1990, the U.S. EPA conducted a removal activity at the facility to remove plating wastes. EPA's contractor conducted a Screening Site Inspection (SSI) under CERCLA after the removal activity. The SSI concluded that no further action was needed and the site was assigned a No Further Remedial Action Planned (NFRAP) status.

In summer and fall of 2000, IDEM (Indiana Department of Environmental Management) staff conducted a reassessment of the EPW site because no offsite samples were collected as part of the SSI. The NFRAP status was based upon the on-site samples collected as part of the SSI and the on-site removal activities. Residential soil samples were collected as part of the reassessment. Analysis of the soil samples collected in 2000 revealed elevated levels of lead. (Reference 6, p. 2-3) Lead levels in the residential soils were found to be as high as 6,150 mg/kg. (Ref. 6, Appendix C, p. 086)

In the winter and spring of 2001, IDEM staff conducted a research project in Evansville, Indiana, at the State Archive Library in Indianapolis, Indiana, and IDEM's air records. The research was conducted to determine if other facilities in the vicinity of the EPW could have contributed to the elevated levels of lead found in residential soils. A review of all of the records identified four former facilities that may have contributed to the lead problem. The four facilities are as follows: Blount Plow Works, Advance Stove Works, Newton-Kelsay, and Sharpes Shot Works. (Reference 6, p. 2-3)

Blount Plow Works operated from the 1880s to the 1940s as a manufacturer of horse driven plows. The facility operated a foundry. A Buehler's IGA now occupies the site. Advance Stove Works, which operated from the turn of the century to about the 1950s, was a manufacturer of stoves. This site also operated a foundry. The site is now operated by the Benthall Brothers. Newton-Kelsay, which operated from the turn of the century to the 1950s, was a manufacturer of hames. The site is now occupied by the McDonald's Restaurant. Sharpes Shot Works operated from 1878 to an unknown date, and manufactured lead shot for guns. The site is now owned by Deaconess Hospital. It is believed that soil from the residential properties became contaminated through airborne emissions during regular operations of these facilities. (Reference 6, p. 2-3 to 2-10)

From June 4, 2001, through June 8, 2001, IDEM staff conducted an Integrated Preliminary Assessment and Site Inspection (PA/SI) at the JNSC site (Reference 6, p. 3-2). The JNSC site encompasses a study area that includes residential properties, the four former facilities listed above and the EPW site. The 250 acre area includes approximately 45 city blocks and is bounded by Edgar Street to the west, Lloyd Expressway to the south, Heidelberg Street to the east and Iowa Street to the north. (Reference 5)

A total of 189 soil samples were collected from residential properties. The samples were collected within the top 6 inches of soil (Reference 6, p. 3-7). The samples were first screened for lead by utilizing a field portable X-Ray Fluorescence (XRF) instrument. The XRF was used to determine which samples had lead concentrations that exceeded 400 mg/kg and were also three times background. This information was needed to determine which samples would be sent for analysis under the CLP (contract laboratory program) for lead concentration verification. Fifty-seven soil samples were sent to the CLP laboratory. The lead concentrations generated by the CLP lab matched well with the XRF screening results. (References 6, p. 3-2; 12).

The lead concentrations and location of each soil sample were plotted on an aerial photograph. Two major areas of contamination were observed. They are named contaminated soil Area A and contaminated soil Area B. The two areas of contamination depict those areas where soil sample results indicate lead concentrations to be at least three times the background soil sample concentration. (Reference 6, Appendix D & E) The elevated levels of lead were determined as a potential risk to approximately 500 residents by the soil exposure pathway. The full extent of the contamination has not been fully delineated and the source of the lead-contaminated soils is undetermined. (Reference 6, p. 2-3) Thus, the source is considered to be the contaminated residential soils. Areas A and B were identified as sources, because lead concentration in soil was at least three times the background concentration. (Reference 5 and 6)

5.0 SOIL EXPOSURE PATHWAY

5.0.1 GENERAL CONSIDERATIONS

Two major areas of contamination were observed at the JNSC site. They are named contaminated soil Area A and contaminated soil Area B.

AREAS OF CONTAMINATION

Source Type: Contaminated Soil

Letter by which this area is to be identified: A

Name of area: Area A

Location and description of area (with reference to a map of the site):

The source is an unevenly bounded area of contaminated soil covering all or portions of 17 blocks (Reference 5). The northeast corner of the contaminated soil is near the intersection of Baker and Iowa Streets. The boundary trends unevenly to the southwest to the northwest corner of the contaminated soil at the intersection of Mary and Michigan Streets. The southwest corner of the contaminated soil is near the intersection of Harriet and Division Streets. The southeast corner is near Indiana Street between Baker Street and Main Street. (References 3 and 5)

- Background Level:

Sample locations initially selected as potentially representative of background conditions revealed several lead concentrations at or below 148 mg/kg with one outlier at 737 mg/kg. A review of the location of the 737 mg/kg sample revealed that the sample was obtained from soils near an old residence where lead based paint had been sand blasted off the brick home. It appeared that the surrounding soils may have come in contact with the paint during paint removal activities. Therefore, this sample was not used as a representative background sample (Reference 14). The highest lead concentration soil sample (SC37) was found to be 148 mg/kg. This sample was used as a background level.

All background and release samples were taken at the same depth from residential yards in the same urban area. All XRF samples were collected and analyzed using the same procedures, as were the samples analyzed at the same laboratory. Reference 6, Appendix B contains the photo log for the samples and indicates that the samples were taken in lawn areas with similar vegetation. The majority of samples were brown with a medium texture and had similar percent solids. (Reference 6, Appendix C) The background sample (SC37) was taken more than 1 mile southeast of the sources and is believed to represent the naturally occurring level of lead in soil in the area. The background soil belongs to the Sciotoville series. The soils in the area of the site belong to the Weinbach series. The two soil series are similar. Both soils have a surface layer that is dark grayish-brown silt loam about 9-10 inches thick. Their organic matter content is moderate. Both soils formed on terraces in loamy, acidic Ohio River alluvium (Reference 17, p. 30, 32). The lead concentration of 148 mg/kg was used to represent background concentration of lead. This sample (SC37) was the only background that was sent to the laboratory for analysis. Background samples were taken in other areas, but were only analyzed by field x-ray fluorescence. The lead concentrations at these other background locations were lower, thus, less conservative.

Sample ID	Sample Medium	Depth	Date	Reference
ME06M4 SC37	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E
SC33 (0-6")	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-6, Appendix B
SC35 (0-6")	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-6, Appendix B
SC34 (0-6")	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-6, Appendix B

Sample ID	Hazardous Substance	Concentration (mg/kg)	Sample Quantitation Limit (mg/kg)	Reference
ME06M4 SC37	Lead	148	0.72 mg/kg	Ref. 6, p. 3-6 and 4-9, Appendix C, p. 001 to 010, 014, 017, 049, 050 and 037
SC33 (0-6")	Lead	46 mg/kg	46 mg/kg	Ref. 6, p. 3-6; and Ref. 15, p. 4-15
SC35 (0-6")	Lead	62 mg/kg	62 mg/kg	Ref. 6, p. 3-6; and Ref. 15, p. 4-15
SC34 (0-6")	Lead	132 mg/kg	48 mg/kg	Ref. 6, p. 3-6; and Ref. 15, p. 4-15

- Contaminated Soil Samples

Contaminated soil samples were obtained from residential yards. (References 5 and 6) The samples were collected from a depth of 0" to 6" (Reference 6, p. 3-7).

Area Letter: A

Sample ID	Sample Medium	Depth	Date	Reference
ME06M7 SB31	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
ME06M2 SB42	Soil	0-6 inches	6/6/2001	Ref. 6, P. 3-2, Appendix B and E
ME06H5 SB77	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E
ME06H6 SB78	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E
ME06H9 SB76	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E
ME06J1 SB74	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E
ME06J2 SC18	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
ME06J3 SC16	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E
ME06J5 SC5	Soil	0-6 inches	6/4/2001	Ref. 6, P. 3-2, Appendix B and E
ME06J7 SC19	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
ME06J8 SC14	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
ME06K0 SC27	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E

ME06K2 SC1	Soil	0-6 inches	6/4/2001	Ref. 6, P. 3-2, Appendix B and E
ME06K3 SA13	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
ME06K5 SA14	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
ME06L0 SC40	Soil	0-6 inches	6/6/2001	Ref. 6, P. 3-2, Appendix B and E
ME06L3 SA66	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E
ME06L6 SB44	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
ME06L7 SB23	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
ME06L9 SB35	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
ME06M0 SB48	Soil	0-6 inches	6/6/2001	Ref. 6, P. 3-2, Appendix B and E
ME06M1 SB41	Soil	0-6 inches	6/6/2001	Ref. 6, P. 3-2, Appendix B and E
ME06F6 SB1	Soil	0-6 inches	6/4/2001	Ref. 6, P. 3-2, Appendix B and E
ME06F9 SB5	Soil	0-6 inches	6/4/2001	Ref. 6, P. 3-2, Appendix B and E
ME06G0 SB12	Soil	0-6 inches	6/4/2001	Ref. 6, P. 3-2, Appendix B and E
ME06G2 SC7	Soil	0-6 inches	6/4/2001	Ref. 6, P. 3-2, Appendix B and E
ME06G3 SC23	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
ME06G4 SC21	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
ME06G6 SB55	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E
ME06G7 SB56	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E
ME06G9 SB70	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E
ME06H0 SA41	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E
ME06H1 SA42	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E

ME06L0 SB84	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E
ME06H2 SA16	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E

Sample ID	Hazardous Substance	Concentration (mg/kg)	Sample Quantitation Limit (mg/kg)	Reference
ME06M7 SB31	Lead	876 mg/kg	0.74 mg/kg	Ref. 6, 001 to 010, 014, 017, Appendix C, p. 039; 13
ME06M2 SB42	Lead	583 mg/kg	0.85 mg/kg	Ref. 6, 001 to 010, 014, 017, Appendix C, p. 035; 13
ME06H5 SB77	Lead	846 mg/kg	0.96 mg/kg	Ref. 6, 107 to 118, 119, 124, Appendix C, p. 128; 13
ME06H6 SB78	Lead	1420 mg/kg	0.81 mg/kg	Ref. 6, 107 to 118, 119, 124, Appendix C, p. 129; 13
ME06H9 SB76	Lead	1680 mg/kg	0.82 mg/kg	Ref. 6, 107 to 118, 119, 124, Appendix C, p. 132; 13
ME06J1 SB74	Lead	787 mg/kg	0.88 mg/kg	Ref. 6, 107 to 118, 119, 120, 124, Appendix C, p. 134; 13
ME06J2 SC18	Lead	777 mg/kg	0.80 mg/kg	Ref. 6, 107 to 118, 119, 120, 124, Appendix C, p. 135; 13
ME06J3 SC16	Lead	599 mg/kg	0.78 mg/kg	Ref. 6, 107 to 118, 119, 120, 124, Appendix C, p. 136; 13
ME06J5 SC5	Lead	1680 mg/kg	0.83 mg/kg	Ref. 6, 107 to 118, 119, 121, 124, Appendix C, p. 138; 13
ME06J7 SC19	Lead	639 mg/kg	0.70 mg/kg	Ref. 6, 107 to 118, 119, 121, 124, Appendix C, p. 140; 13
ME06J8 SC14	Lead	442 mg/kg	0.73 mg/kg	Ref. 6, 107 to 118, 119, 121, 124, Appendix C, p. 141; 13
ME06K0 SC27	Lead	667 mg/kg	0.74 mg/kg	Ref. 6, 107 to 118, 119, 122, 124, Appendix C, p. 143; 13
ME06K2 SC1	Lead	515 mg/kg	0.81 mg/kg	Ref. 6, 107 to 118, 119, 122, 124, Appendix C, p. 145; 13

Sample ID	Hazardous Substance	Concentration (mg/kg)	Sample Quantitation Limit (mg/kg)	Reference
ME06K3 SA13	Lead	425 mg/kg	0.80 mg/kg	Ref. 6, 107 to 118, 119, 122, 124, Appendix C, p. 146; 13
ME06K5 SA14	Lead	470 mg/kg	0.80 mg/kg	Ref. 6, 001 to 010, 011, 016, Appendix C, p. 020; 13
ME06L0 SC40	Lead	976 mg/kg	0.90 mg/kg	Ref. 6, 001 to 010, 011, 016, Appendix C, p. 024; 13
ME06L3 SA66	Lead	2680 mg/kg J (1861 mg/kg)	0.80 mg/kg	Ref. 6,001 to 010, 012, 016, Appendix C, p. 027; 13
ME6L6 SB44	Lead	1520 mg/kg	0.84 mg/kg	Ref. 6, 001 to 010, 012, 016, Appendix C, p. 029; 13
ME06L7 SB23	Lead	841 mg/kg	1.01 mg/kg	Ref. 6, 001 to 010, 013, 017, Appendix C, p. 030; 13
ME06L9 SB35	Lead	525 mg/kg	0.68 mg/kg	Ref. 6, 001 to 010, 013, 017, Appendix C, p. 032; 13
ME06M0 SB48	Lead	542 mg/kg	0.79 mg/kg	Ref. 6, 001 to 010, 013, 017, Appendix C, p. 033; 13
ME06M1 SB41	Lead	2010 mg/kg	0.88 mg/kg	Ref. 6, 001 to 010, 013, 017, Appendix C, p. 034; 13
ME06F6 SB1	Lead	2090 mg/kg	0.82 mg/kg	Ref. 6, 054 to 065, 066, 070, 071, Appendix C, p. 074; 13
ME06F9 SB5	Lead	605 mg/kg	0.75 mg/kg	Ref. 6, 054 to 065, 066, 070, 071, Appendix C, p. 076; 13
ME06G0 SB12	Lead	679 mg/kg	0.90 mg/kg	Ref. 6, 054 to 065, 066, 070, 071, Appendix C, p. 077; 13
ME06G2 SC7	Lead	1120 mg/kg	0.76 mg/kg	Ref. 6, 054 to 065, 067, 070, 071, Appendix C, p. 079; 13
ME06G3 SC23	Lead	755 mg/kg	0.66 mg/kg	Ref. 6, 054 to 065, 067, 070, 071, Appendix C, p. 080; 13
ME06G4 SC21	Lead	979 mg/kg	0.94 mg/kg	Ref. 6, 054 to 065, 067, 070, 071, Appendix C, p. 081; 13

Sample ID	Hazardous Substance	Concentration (mg/kg)	Sample Quantitation Limit (mg/kg)	Reference
ME06G6 SB55	Lead	1290 mg/kg	0.85 mg/kg	Ref. 6, 054 to 065, 067, 070, 071, Appendix C, p. 083; 13
ME06G7 SB56	Lead	6290 mg/kg J (4368 mg/kg)	1.20 mg/kg	Ref. 6, 054 to 065, 068, 070, 071, Appendix C, p. 084; 13
ME06G9 SB70	Lead	6150 mg/kg J (4271 mg/kg)	1.0 mg/kg	Ref. 6, 054 to 065, 068, 070, 071, Appendix C, p. 086; 13
ME06H0 SA41	Lead	1960 mg/kg	0.80 mg/kg	Ref. 6, 054 to 065, 068, 070, 071, Appendix C, p. 087; 13
ME06H1 SA42	Lead	634 mg/kg	1.1 mg/kg	Ref. 6, 054 to 065, 068, 070, 071, Appendix C, p. 088; 13
ME06L0 SB84	Lead	976 mg/kg	0.90 mg/kg	Ref. 6, 001 to 010, 011, 016, Appendix C, p. 024; 13
ME06H2 SA16	Lead	718 mg/kg	0.86 mg/kg	Ref. 6, 054 to 065, 069, 070, 071, Appendix C, p. 089; 13

Notes:

1. No benchmark has been established for lead levels in soil. Thus, Level II was assigned as stated in section 2.5, p.51592. (Reference 1)
2. Items in bold are at least 3 times the background concentration
3. Estimated concentrations, those with 'J' qualifiers, have been adjusted in parentheses according to their analytical biases, based on EPA guidance. (Reference 16, p. 18)

Attribution

Several sampling events at the JNSC site in 1990, 2000 and 2001 have indicated elevated levels of lead in residential soils. Investigations have revealed that the lead contamination may be attributable to five facilities that historically operated in the vicinity of the site. These sites include; EPW, Blount Plow Works, Advance Stove Works, Newton-Kelsay, and Sharpes Shot Works. (Reference 6, p. 2-3)

However, the source of the lead contaminated soils remains undetermined (Reference 6, p.2-3). Thus, the source is considered to be the contaminated residential soils. Area A was identified as a source, because lead concentration in soil was at least three times the background concentration. (Reference 5)

Source Type: Contaminated Soil

Letter by which this area is to be identified: B

Name of area: Area B

Location and description of area (with reference to a map of the site): This area of soil contamination is a four-sided polygon. Area B is 1-2 blocks east of Area A. It is also a residential area. The northeast corner of the contaminated soil is near the intersection of Michigan and Governor Streets. The northwest corner of the contaminated soil is near the intersection of Michigan and Heidelberg Streets. The southwest corner of the contaminated soil is located on Franklin Street between Main and Heidelberg Streets. The southeast corner of the contaminated soil is near the intersection of Franklin and Governor Streets. (Reference 5)

- Background Levels:

Sample locations initially selected as potentially representative of background conditions revealed several lead concentrations at or below 148 mg/kg with one outlier at 737 mg/kg. A review of the location of the 737 mg/kg sample revealed that the sample was obtained from soils near an old residence where lead based paint had been sand blasted off the brick home. It appeared that the surrounding soils may have come in contact with the paint during paint removal activities. Therefore, this sample was not used as a representative background sample (Reference 14). The highest lead concentration soil sample (SC37) was found to be 148 mg/kg. This sample was used as a background level.

All background and release samples were taken at the same depth from residential yards in the same urban area. All XRF samples were collected and analyzed using the same procedures, as were the samples analyzed at the same laboratory. Reference 6, Appendix B contains the photo log for the samples and indicates that the samples were taken in lawn areas with similar vegetation. The majority of samples were brown with a medium texture and had similar percent solids. (Reference 6, Appendix C) The background sample (SC37) was taken more than 1 mile southeast of the sources and is believed to represent the naturally occurring level of lead in soil in the area. The background soil belongs to the Sciotoville series. The soils in the area of the site belong to the Weinbach series. The two soil series are similar. Both soils have a surface layer that is dark grayish-brown silt loam about 9-10 inches thick. Their organic matter content is moderate. Both soils formed on terraces in loamy, acidic Ohio River alluvium (Reference 17, p. 30, 32). The lead concentration of 148 mg/kg was used to represent background concentration of lead. This sample (SC37) was the only background that was sent to the laboratory for analysis. Background samples were taken in other areas, but were only analyzed by field x-ray fluorescence. The lead concentrations at these other background locations were lower, thus, less conservative.

Sample ID	Sample Medium	Depth	Date	Reference
ME06M4 SC37	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B
SC33 (0-6")	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-6, Appendix B
SC35 (0-6")	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-6, Appendix B
SC34 (0-6")	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-6, Appendix B

Sample ID	Hazardous Substance	Concentration (mg/kg)	Sample Quantitation Limit (mg/kg)	Reference
ME06M4 SC37	Lead	148	0.72 mg/kg	Ref. 6, p. 3-6 and 4-9, Appendix B and C, p. 001 to 010, 014, 017, 049, 050 and 037; Ref. 13
SC33 (0-6")	Lead	46 mg/kg	46 mg/kg	Ref. 6, p. 3-6, Appendix B; and Ref. 15, p. 4-15
SC35 (0-6")	Lead	62 mg/kg	62 mg/kg	Ref. 6, p. 3-6, Appendix B; and Ref. 15, p. 4-15
SC34 (0-6")	Lead	132 mg/kg	48 mg/kg	Ref. 6, p. 3-6, Appendix B; and Ref 15, p. 4-15

- Contaminated Soil Samples

Contaminated soil samples were obtained from residential yards. (References 5 and 6) The samples were collected from a depth of 0" to 6" (Reference 6, p. 3-7).

Area Letter: B

Sample ID	Sample Medium	Depth	Date	Reference
ME06K4 SA19	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
ME06J4 SA51	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E
ME06K6 SA52	Soil	0-6 inches	6/7/2001	Ref. 6, P. 3-2, Appendix B and E
ME06L1 SA29	Soil	0-6 inches	6/6/2001	Ref. 6, P. 3-2, Appendix B and E
ME06L4 SB27	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
ME06G8 SB28	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
SA2	Soil	0-6 inches	6/4/2001	Ref. 6, P. 3-2, Appendix B and E
SA30	Soil	0-6 inches	6/6/2001	Ref. 6, P. 3-2, Appendix B and E
SB16	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E
SB26	Soil	0-6 inches	6/5/2001	Ref. 6, P. 3-2, Appendix B and E

Sample ID	Hazardous Substance	Concentration (mg/kg)	Sample Quantitation Limit (mg/kg)	Reference
ME06K4 SA19	Lead	547 mg/kg	0.94 mg/kg	Ref. 6, 107 to 118, 122, 124, Appendix C, p. 147; 13
ME06J4 SA51	Lead	2890 mg/kg J (2007 mg/kg)	0.85 mg/kg	Ref. 6, 107 to 118, 119, 120, 124, Appendix C, p. 137; 13
ME06K6 SA52	Lead	753 mg/kg	0.88 mg/kg	Ref. 6, 001 to 010, 011, 016, Appendix C, p. 021; 13
ME06L1 SA29	Lead	567 mg/kg	0.95 mg/kg	Ref. 6, 001 to 010, 012, 016, Appendix C, p. 025; 13
ME06L4 SB27	Lead	507 mg/kg	0.81 mg/kg	Ref. 6, 001 to 010, 012, 016, Appendix C, p. 028; 13

Sample ID	Hazardous Substance	Concentration (mg/kg)	Sample Quantitation Limit (mg/kg)	Reference
ME06G8 SB28	Lead	1440 mg/kg	1.01 mg/kg	Ref. 6, 054-065, 068, 070, 071 Appendix C, p. 085; 13
SA2	Lead	420 mg/kg	59.6 mg/kg	Ref. 6, p. 3-3; and Ref. 15, p. 4-2
SA30	Lead	482 mg/kg	69.7 mg/kg	Ref. 6, p. 3-3; and Ref. 15, p. 4-4
SB16	Lead	1110 mg/kg	97.9 mg/kg	Ref. 6, p. 3-4; and Ref. 15, p. 4-8
SB26	Lead	686 mg/kg	73.2 mg/kg	Ref. 6, p. 3-4; and Ref. 15, p. 4-8
SA53	Lead	456 mg/kg	67.1 mg/kg	Ref. 6, p. 3-4; and Ref. 15, p. 4-6

Notes:

1. No benchmark has been established for lead levels in soil. Thus, Level II was assigned as stated in section 2.5, p.51592. (Reference 1)
2. Items in bold are at least 3 times the background concentration.

Attribution

Several sampling events at the JNSC site in 1990, 2000 and 2001 have indicated elevated levels of lead in residential soils. Investigations have revealed that the lead contamination may be attributable to five facilities that historically operated in the vicinity of the site. These sites include; EPW, Blount Plow Works, Advance Stove Works, Newton-Kelsay, and Sharpes Shot Works. (Reference 6, p. 2-3)

However, the source of the lead contaminated soils remains undetermined (Reference 6, p.2-3). Thus, the source is considered to be the contaminated residential soils. Area B was identified as a source, because lead concentration in soil was at least three times the background concentration. (Reference 5)

AREAS OF CONTAMINATION HAZARDOUS WASTE QUANTITY

The following discussion includes estimates of the hazardous waste quantity of both Areas of Contamination.

Area Hazardous Waste Quantity

- Hazardous Constituent Quantity:

Description

Hazardous Substance	Constituent Quantity (pounds)	References
Lead	ND	

Sum (pounds):

Hazardous Constituent Quantity Assigned Value: 0

- Hazardous Wastestream Quantity:

Description

Hazardous Wastestream	Wastestream Quantity (pounds)	References

Sum (pounds):

Wastestream Quantity/5,000 (Table 5-2):

Hazardous Wastestream Quantity Assigned Value: 0

- Volume:

Description

Source Type	Description (# drums or dimensions)	Units (yd ³ /gal)	References
Soil		ND	

Sum (yd³/gal):

Equation for Assigning Value (Table 5-2):

Volume Assigned Value: 0

- Area:

Description

The surface area covered by contaminated soil was used to determine the Source Hazardous Waste Quantity Value. The surface area of contaminated soil was determined by using maps of the soil sampling results. Based on the maps, two areas of soil contamination were delineated; Contaminated Soil Site Area A and Contaminated Soil Site Area B. The area of the two contaminated soil areas was calculated utilizing ArcGIS software and a digitized map showing the street layout and sample location. The Source Areas A and B were delineated based on sample locations with lead levels greater than 450 ppm. Then these Source Areas were compared to the Digital Ortho Quarter Quadrangles for Vanderburgh County, IN. ArcGIS was used to calculate area of Area A and Area B in square meters. The area in square meters was multiplied by a conversion factor of 10.7639 to get the area in square feet. (Reference 8) The area of Contaminated Area A was found to be 1,660,216.508909 square feet. The area of Contaminated Area B was found to be 267,967.511 square feet. (Reference 8 and Reference 13)

As measured with ArcGIS software, the affected area, both Area A and Area B together, measure at least 1928184.019 square feet. The affected areas have not been adequately determined because this area includes soil covered by paving and structures and so is greater than the area of contaminated soils that people may be exposed to. Therefore, since the hazardous constituent quantity is greater than 0 but not adequately determined for the areas of observed contamination, a value of 10 is assigned as the hazardous waste quantity factor value. (Reference 8; Reference 13; Reference 1, 40 CFR, Part 300, Page 51592, Part 2.4.2.2.)

Source Type	Units (ft ²)	References
Contaminated Soil Site Area A	>0	Ref. 5, Ref. 8
Contaminated Soil Site Area B	>0	Ref. 5, Ref. 8

Sum (ft²):>0

Equation for Assigning Value (Table 5-2): A/34,000

Area Assigned Value: Unknown, >0

Notes:

Not Determined = ND

5.1 RESIDENT POPULATION THREAT

5.1.1 LIKELIHOOD OF EXPOSURE

In the winter and spring of 2001, IDEM staff conducted a research project in Evansville, Indiana, the State Archive Library in Indianapolis, Indiana, and IDEM's air records. The research was conducted to determine if other facilities in the vicinity of the EPW could have contributed to the elevated levels of lead found in residential soils. A review of all of the records identified four former facilities that may have contributed to the lead problem. The four facilities are as follows: Blount Plow Works, Advance Stove Works, Newton-Kelsay, and Sharpes Shot Works.

These facilities, conducted foundry operations. Sharpes Shot works actually manufactured lead shot by first melting the lead. Old pictures/sketches of the former Blount Plow Works depict thick amounts of smoke belching from numerous smokestacks at the Blount facility. According to the Joan Marchand files at the Willard Library in Evansville, Indiana, these facilities were located in a mix of residential, commercial and industrial properties. Residents didn't mind carrying out their daily lives in the midst of industrial pollution. It is assumed that impurities, such as lead, can be found within the steel at most foundries, and may have been transported to the air by way of onsite stacks. Nearby soils would then become contaminated as the impurities in the air would be deposited to nearby soils (air deposition).

Two areas of observed contamination (Areas A and B) were delineated by collecting and analyzing surface soil samples from residential yards and within 200 feet of the respective residences (See section 5.0.1). All soil samples with lead levels greater than 450 mg/kg were considered to be contaminated. Residential yards that were not sampled but were contiguous with two yards that were found to be contaminated, were also inferred to be contaminated based on air deposition (HRS 5.0.1). The following samples meet the requirement to establish observed contamination. The Resident Individual is located at 403 Read Street. A family of three people live in the house at this address. (Reference 18). The sample number is ME06G7/SB56.

Sample ID	Distance of Population/Resource from Area of Observed Contamination	Reference
ME06M7 SB31	<200 feet	Ref. 6, Appendix E
ME06M2 SB42	<200 feet	Ref. 6, Appendix E
ME06H5 SB77	<200 feet	Ref. 6, Appendix E
ME06H6 SB78	<200 feet	Ref. 6, Appendix E
ME06H9 SB76	<200 feet	Ref. 6, Appendix E
ME06J1 SB74	<200 feet	Ref. 6, Appendix E
ME06J2 SC18	<200 feet	Ref. 6, Appendix E
ME06J3 SC16	<200 feet	Ref. 6, Appendix E
ME06J4 SA51	<200 feet	Ref. 6, Appendix E
ME06J5 SC5	<200 feet	Ref. 6, Appendix E

ME06J7 SC19	<200 feet	Ref. 6, Appendix E
ME06J8 SC14	<200 feet	Ref. 6, Appendix E
ME06K0 SC27	<200 feet	Ref. 6, Appendix E
ME06K2 SC1	<200 feet	Ref. 6, Appendix E
ME06K3 SA13	<200 feet	Ref. 6, Appendix E
ME06K5 SA14	<200 feet	Ref. 6, Appendix E
ME06L0 SC40	<200 feet	Ref. 6, Appendix E
ME06L3 SA66	<200 feet	Ref. 6, Appendix E
ME06L6 SB44	<200 feet	Ref. 6, Appendix E
ME06L7 SB23	<200 feet	Ref. 6, Appendix E
ME06L9 SB35	<200 feet	Ref. 6, Appendix E
ME06M0 SB48	<200 feet	Ref. 6, Appendix E
ME06M1 SB41	<200 feet	Ref. 6, Appendix E
ME06F6 SB1	<200 feet	Ref. 6, Appendix E
ME06F9 SB5	<200 feet	Ref. 6, Appendix E
ME06G0 SB12	<200 feet	Ref. 6, Appendix E
ME06G2 SC7	<200 feet	Ref. 6, Appendix E
ME06G3 SC23	<200 feet	Ref. 6, Appendix E
ME06G4 SC21	<200 feet	Ref. 6, Appendix E
ME06G6 SB55	<200 feet	Ref. 6, Appendix E

ME06G7 SB56	<200 feet	Ref. 6, Appendix E
ME06G9 SB70	<200 feet	Ref. 6, Appendix E
ME06H0 SA41	<200 feet	Ref. 6, Appendix E
ME06H1 SA42	<200 feet	Ref. 6, Appendix E
ME06L0 SB84	<200 feet	Ref. 6, Appendix E
ME06H2 SA16	<200 feet	Ref. 6, Appendix E
ME06K4 SA19	<200 feet	Ref. 6, Appendix E
ME06K6 SA52	<200 feet	Ref. 6, Appendix E
ME06L1 SA29	<200 feet	Ref. 6, Appendix E
ME06L4 SB27	<200 feet	Ref. 6, Appendix E
ME06G8 SB28	<200 feet	Ref. 6, Appendix E
SA2	<200 feet	Ref. 6, Appendix E
SA30	<200 feet	Ref. 6, Appendix E
SB16	<200 feet	Ref. 6, Appendix E
SB26	<200 feet	Ref. 6, Appendix E
SA51	<200 feet	Ref. 6, Appendix E
SA53	<200 feet	Ref. 6, Appendix E

Resident Population Threat Likelihood of
Exposure Factor Category Value: 550

5.1.2 WASTE CHARACTERISTICS

5.1.2.1 Toxicity

As illustrated previously in this documentation record, levels of lead have been detected greater than three times the background level in residential soils in both areas of observed contamination.

Hazardous Substance	Toxicity Factor Value	Reference
Lead	10,000	Ref. 2, p. BI-8

Toxicity Factor Value: 10,000

5.1.2.2 Hazardous Waste Quantity

Area Letter	Source Type	Area Hazardous Waste Quantity
A	Contaminated Soil	>0
B	Contaminated Soil	>0

Sum of Values: Unknown, but >0

Hazardous Waste Quantity Factor Value: 10
(Table 2-6)

The hazardous constituent quantity was not adequately determined for one or more areas of observed contamination, tier D was used, for soil exposure pathway. Thus, a value of 10 was assigned, as stated in the HRS (Ref. 1, 2.4.2.2, p.51592)

5.1.2.3 Calculation of Waste Characteristics Factor Category Value

Toxicity Factor Value: 10,000

Hazardous Waste Quantity Factor Value: 10

Toxicity Factor Value x Hazardous Waste Quantity Factor Value: $10,000 \times 10 = 100,000$

Waste Characteristics Factor Category Value: 18
(Table 2-7)

5.1.3 TARGETS

5.1.3.1 Resident Individual

The Resident Individual is located at 403 Read Street. A family of three people live in the house at this address. (Reference 18). The sample number is ME06G7/SB56. In addition, there are over 500 people that live within the area of observed contamination (Reference 8).

Level of Contamination (Level I/Level II): Level II

Reference: Ref. 1, section 5.1.3.1 p. 51647; Ref. 2; Ref. 8; Ref. 9

Resident Individual Factor Value: 45

5.1.3.2 Resident Population

5.1.3.2.1 Level I Concentrations

No Level I concentrations present.

Level I Concentrations Factor Value: 0

5.1.3.2.2 Level II Concentrations

The number of people that live in each area of contamination and within 200 feet of the area of contamination was calculated from the U.S Department of Agriculture by using 2000 census block group data, Census TIGER 2000 data, Spatial Reference System, UTM (Universal Transverse Mercator) Coordinate System, and NAD 1983 (North American Datum 1983) Zone 16N.prj (projected). The area of each source was electronically overlaid onto a census block map. Then, ArcGIS and ArcView were used to determine the percentages of population in each census block within Area A and Area B.

- In Source Area A there are 482 people (Ref. 5, Ref. 8, Ref. 9)
- In Source Area B, there are 60 people (Ref. 5, Ref. 8, Ref. 9)

Samples from contaminated properties are shown in Section 5.1.1

Sum of individuals subject to Level II concentrations: 542

Level II Concentrations Factor Value: 542

5.1.3.3 Workers

The average number of employees at Buehler's Buy-Lo in Area A is estimated to be 70 (Reference 7).

Area Letter	Number of Workers	References
A	70	Ref. 7
B	Not determined	

Total workers: 70

Workers Factor Value: 5
(Table 5-4)

5.1.3.4 Resources

Description of Resource(s): None identified

Resources Factor Value: 0

5.1.3.5 Terrestrial Sensitive Environments

No terrestrial sensitive environments identified. (Reference 6, p.4-4)

Terrestrial Sensitive Environments Factor Value: 0